

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A digital-watermark-embedding apparatus for embedding a digital watermark into a content, said digital-watermark-embedding apparatus comprising:

a picture input unit for inputting said content;

a vision-sensitivity computation unit and a digital-watermark embedment unit, which are connected to said picture input unit; and

a picture compression unit connected to said vision-sensitivity computation unit and said digital-watermark embedment unit;

wherein:

wherein said vision-sensitivity computation unit creates a noise-vision-sensitivity index from a variance of luminance values of a block included in a picture frame received from said picture input unit and outputs said noise-vision-sensitivity index to said digital-watermark embedment unit and said picture compression unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture frame by changing luminance values of each block included in said picture frame on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit, and outputs said picture frame including said embedded digital watermark to said picture compression unit; and

wherein said picture compression unit creates a quantization parameter on the basis of said noise-vision-sensitivity index received from said vision-sensitivity

computation unit, and compresses said picture frame including said embedded digital watermark on the basis of said quantization parameter.

2. (currently amended): A digital-watermark-embedding apparatus according to claim 1, further comprising:

a motion-searching unit connected to said picture input unit, connected to said digital-watermark embedment unit as well as connected to said picture compression unit;

wherein:

wherein said motion-searching unit compares a specific block included in a picture frame received from said picture input unit with a block included in another picture frame received from said picture input unit to create a motion vector to be output to said digital-watermark embedment unit and said picture compression unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture frame by changing luminance values of each block included in said picture frame on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit as well as said motion vector received from said motion-searching unit, and outputs said picture frame including said embedded digital watermark to said picture compression unit; and

wherein said picture compression unit creates a quantization parameter on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit, and compresses said picture frame including said embedded digital watermark on the basis of said quantization parameter as well as said motion vector received from said motion-searching unit.

3. (currently amended): A digital-watermark-embedding apparatus

according to claim 2, wherein:

wherein said digital-watermark embedment unit includes a digital-watermark-embedment control unit as well as a motion-vector buffer unit, a vision-sensitivity buffer unit and a picture buffer unit, which are connected to said digital-watermark-embedment control unit; and

wherein said digital-watermark-embedment control unit executes control so as to carry out a process of embedding a digital watermark into a picture frame after said motion vector is supplied to said motion-vector buffer unit, said noise-vision-sensitivity index is supplied to said vision-sensitivity buffer unit and said picture frame is supplied to said picture buffer unit.

4. (currently amended): A digital-watermark-embedding apparatus

according to claim 3, further comprising:

a change-quantity computation unit connected to said motion-vector buffer unit and connected to said vision-sensitivity buffer unit; and

a pixel-changing unit connected to said change-quantity computation unit and connected to said picture buffer unit;

wherein:

wherein after said motion vector is supplied to said motion-vector buffer unit and said noise-vision-sensitivity index is supplied to said vision-index buffer unit, said digital-watermark-embedment control unit outputs said motion vector and said noise-vision-sensitivity index to said change-quantity computation unit for use in computation of a pixel-change quantity; and

wherein control is executed so as to carry out a process of embedding a

digital watermark into a picture frame after said pixel-change quantity and said picture frame stored in said picture buffer unit are supplied to said pixel-changing unit.

5. (currently amended): A digital-watermark-embedding apparatus

according to claim 2, ~~wherein:~~

wherein said picture compression unit includes a compression control unit as well as a motion-vector buffer unit, a vision-sensitivity buffer unit and a picture buffer unit, which are connected to said compression control unit; and

wherein said compression control unit executes control so as to carry out a compression process after said motion vector is supplied to said motion-vector buffer unit, said noise-vision-sensitivity index is supplied to said vision-sensitivity buffer unit and a predetermined frame with blocks thereof including said embedded digital watermark is supplied to said picture buffer unit.

6. (currently amended): A digital-watermark-embedding apparatus

according to claim 2,

wherein, if said input content is a static picture, said motion vector output by said motion-searching unit is set at a zero before being supplied to said digital-watermark embedment unit and said picture compression unit.

7. (currently amended): A digital-watermark-embedding apparatus for

embedding a digital watermark into an input content, said digital-watermark-embedding apparatus comprising:

an input unit for inputting a compressed and encoded picture as said content;

a picture-decoding unit for carrying out a decoding process on said compressed and encoded picture received from said input unit;

a digital-watermark embedment unit for embedding a digital watermark into a picture obtained as a result of said decoding process carried out by said picture-decoding unit; and

a picture output unit for outputting a picture including said digital-watermark embedded by said digital-watermark embedment unit,

wherein:

wherein said picture-decoding unit carries out a decoding process on an encoded motion vector and an encoded quantization parameter, which are included in said compressed and encoded picture, and outputs a motion vector and a quantization parameter, which are each obtained as a result of said decoding process, to said digital-watermark embedment unit; and

wherein said digital-watermark embedment unit embeds said digital watermark into said picture obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit.

8. (currently amended): A digital-watermark-embedding apparatus for embedding a digital watermark into a content, said digital-watermark-embedding apparatus comprising:

an input unit for inputting an encoded picture as said content;

a picture-decoding unit for carrying out a decoding process on said encoded picture received from said input unit;

a digital-watermark embedment unit for embedding a digital watermark into a

picture obtained as a result of said decoding process carried out by said picture-decoding unit; and

a picture compression unit for compressing as well as encoding a picture including said digital-watermark embedded by said digital-watermark embedment unit and for outputting a compressed and encoded picture including said embedded digital watermark,

wherein:

wherein said picture-decoding unit carries out a decoding process on an encoded motion vector and an encoded quantization parameter, which are included in said encoded picture, and outputs a motion vector and a quantization parameter, which are each obtained as a result of said decoding process, to said digital-watermark embedment unit and said picture compression unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit, and outputs a picture frame including said embedded digital watermark to said picture compression unit; and

wherein said picture compression unit compresses said picture including said digital-watermark embedded by said digital-watermark embedment unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit.

9. (currently amended): A digital-watermark-embedding apparatus according to claim 7 or 8.

wherein, if said input unit receives a compressed and encoded picture including quantization parameters having values spread in accordance with a predetermined distribution, said output picture is a picture including said embedded digital watermark with embedment intensities, which are spread in accordance with a distribution matching said predetermined distribution of said quantization-parameter values.

10. (currently amended): A program embodied on a computer-readable medium, said program to be executed by a computer to carry out functions of:

a picture input unit for inputting a picture frame;

a motion-vector creation unit for creating a motion vector by comparison of a specific block included in said picture frame received from said picture input unit with a block included in another picture frame received from said picture input unit;

a vision-sensitivity computation unit for creating a noise-vision-sensitivity index from a variance of luminance values of said specific block included in said picture frame;

a digital-watermark embedment unit for embedding a digital watermark into said picture frame by changing luminance values of each block included in said picture frame on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit and said motion vector received from said motion-vector creation unit in order to create a picture frame including said embedded digital watermark; and

a picture compression unit for creating a quantization parameter on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit as well as for compressing said picture frame including said

embedded digital watermark on the basis of said quantization parameter and said motion vector received from said motion-vector creation unit.

11. (currently amended): A program embodied on a computer-readable medium, said program to be executed by a computer to carry out functions of:

an input unit for inputting an encoded and compressed picture frame;

a picture-decoding unit for carrying out a decoding process on said encoded and compressed picture frame received from said input unit to extract a motion vector and a quantization parameter from said encoded and compressed picture; and

a digital-watermark embedment unit for embedding a digital watermark into a picture frame obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said quantization parameter and said motion vector, which are received from said picture-decoding unit.

12. (currently amended): A program embodied on a computer-readable medium, said program to be executed by a computer to carry out functions of:

an input unit for inputting an encoded picture frame;

a picture-decoding unit for carrying out a decoding process on said encoded picture frame received from said input unit to extract a motion vector and a quantization parameter from said encoded picture;

a digital-watermark embedment unit for embedding a digital watermark into a picture frame obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said quantization parameter and said motion vector, which are received from said picture-decoding unit; and

a picture compression unit for compressing a picture including said digital-watermark embedded by said digital-watermark embedment unit on the basis of said quantization parameter and said motion vector, which are received from said picture-decoding unit.

13. (currently amended): A An information-processing system comprising:
a display unit for displaying an input picture_i and
a storage unit for storing information_i; ~~said information-processing system comprising:~~
a picture input unit for inputting said input picture;
a motion-searching unit, a vision-sensitivity computation unit and a digital-watermark embedment unit, which are connected to said picture input unit; and
a picture compression unit connected to said motion-searching unit, said vision-sensitivity computation unit and said digital-watermark embedment unit,
wherein:
wherein said motion-searching unit compares a specific block included in a picture frame received from said picture input unit with a block included in another picture frame received from said picture input unit to create a motion vector to be output to said digital-watermark embedment unit and said picture compression unit_i;
wherein said vision-sensitivity computation unit creates a noise-vision-sensitivity index from a variance of luminance values of said specific block included in said picture frame received from said picture input unit and outputs said noise-vision-sensitivity index to said digital-watermark embedment unit and said picture compression unit;
wherein said digital-watermark embedment unit embeds a digital watermark

into said picture frame by changing luminance values of each block included in said picture frame on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit as well as said motion vector received from said motion-searching unit, and outputs said picture frame including said embedded digital watermark to said picture compression unit;¹ and

wherein said picture compression unit creates a quantization parameter on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit, compresses said picture frame including said embedded digital watermark on the basis of said quantization parameter as well as said motion vector received from said motion-searching unit, and outputs said compressed picture frame including said embedded digital watermark to said storage unit.

14. (currently amended): An information-processing system for inputting a compressed and encoded content and displaying said compressed and encoded content, said information-processing system comprising:

an input unit for inputting a compressed and encoded picture as said compressed and encoded content;

a picture-decoding unit for carrying out a decoding process on said compressed and encoded picture received from said input unit;

a digital-watermark embedment unit for embedding a digital watermark into a picture obtained as a result of said decoding process carried out by said picture-decoding unit; and

a picture output unit for outputting a picture including said digital-watermark embedded by said digital-watermark embedment unit;¹

wherein:

wherein said picture-decoding unit also carries out a decoding process on an encoded motion vector and an encoded quantization parameter, which are included in said compressed and encoded picture, and outputs a motion vector and a quantization parameter, which are each obtained as a result of said decoding process, to said digital-watermark embedment unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit; and

wherein said display unit displays said picture including said embedded digital watermark.

15. (currently amended): An information distribution system connected to a network, said information distribution system ~~having~~ comprising:

a picture input unit for inputting an encoded picture from said network;

a picture-decoding unit for carrying out a decoding process on said encoded picture received from said picture input unit;

a digital-watermark embedment unit for embedding a digital watermark into a picture obtained as a result of said decoding process carried out by said picture-decoding unit; and

a picture compression unit for compressing as well as encoding a picture including said digital-watermark embedded by said digital-watermark embedment unit and for outputting a compressed and encoded picture including said embedded digital watermark;

wherein:

wherein said picture-decoding unit also carries out a decoding process on an encoded motion vector and an encoded quantization parameter, which are included in said encoded picture, and outputs a motion vector and a quantization parameter, which are each obtained as a result of said decoding process, to said digital-watermark embedment unit and said picture compression unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit, and outputs a picture frame including said embedded digital watermark to said picture compression unit; and

wherein said picture compression unit compresses said picture including said digital-watermark embedded by said digital-watermark embedment unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit, and outputs said compressed picture including said embedded digital watermark to said network.

16. (currently amended): An integrated circuit for embedding a digital watermark into a content, said integrated circuit comprising:

a picture input unit for inputting said content;

a motion-searching unit, a vision-sensitivity computation unit and a digital-watermark embedment unit, which are connected to said picture input unit; and

a picture compression unit connected to said motion-searching unit, said vision-sensitivity computation unit and said digital-watermark embedment unit;

wherein:

wherein said motion-searching unit compares a specific block included in a picture frame received from said picture input unit with a block included in another picture frame also received from said picture input unit to create a motion vector to be output to said digital-watermark embedment unit and said picture compression unit;

wherein said vision-sensitivity computation unit creates a noise-vision-sensitivity index from a variance of luminance values of said specific block included in said picture frame received from said picture input unit and outputs said noise-vision-sensitivity index to said digital-watermark embedment unit and said picture compression unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture frame by changing luminance values of each block included in said picture frame on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit as well as said motion vector received from said motion-searching unit, and outputs said picture frame including said embedded digital watermark to said picture compression unit; and

wherein said picture compression unit creates a quantization parameter on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation unit, and compresses said picture frame including said embedded digital watermark on the basis of said quantization parameter as well as said motion vector received from said motion-searching unit.

17. (currently amended): An integrated circuit for embedding a digital watermark into a content, said integrated circuit having comprising:
an input unit for inputting a compressed and encoded picture as said content;

a picture-decoding unit for carrying out a decoding process on said compressed and encoded picture received from said input unit;
a digital-watermark embedment unit for embedding said digital watermark into a picture obtained as a result of said decoding process carried out by said picture-decoding unit; and
a picture output unit for outputting a picture including said digital-watermark embedded by said digital-watermark embedment unit;

wherein:

wherein said picture-decoding unit carries out a decoding process on an encoded motion vector and an encoded quantization parameter, which are included in said compressed and encoded picture, and outputs a motion vector and a quantization parameter, which are each obtained as a result of said decoding process, to said digital-watermark embedment unit; and

wherein said digital-watermark embedment unit embeds said digital watermark into said picture obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit.

18. (currently amended): An integrated circuit for embedding a digital watermark into a content, said integrated circuit having comprising:

a picture input unit for inputting an encoded picture as said content;

a picture-decoding unit for carrying out a decoding process on said encoded picture received from said picture input unit;

a digital-watermark embedment unit for embedding said digital watermark into a picture obtained as a result of said decoding process carried out by said picture-

decoding unit; and

a picture compression unit for compressing as well as encoding a picture including said digital-watermark embedded by said digital-watermark embedment unit,

wherein:

wherein said picture-decoding unit also carries out a decoding process on an encoded motion vector and an encoded quantization parameter, which are included in said encoded picture, and outputs a motion vector and a quantization parameter, which are each obtained as a result of said decoding process, to said digital-watermark embedment unit and said picture compression unit;

wherein said digital-watermark embedment unit embeds said digital watermark into said picture obtained as a result of said decoding process carried out by said picture-decoding unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit; and

wherein said picture compression unit compresses said picture including said digital-watermark embedded by said digital-watermark embedment unit on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding unit.

19. (original): A digital-watermark-embedding method of embedding a digital watermark into a content, said digital-watermark-embedding method comprising:

a picture input process of inputting said content;

a frame extraction process of extracting a picture frame from said content input in said picture input process and outputting said picture frame to a motion-

searching unit, a vision-sensitivity computation unit and a digital-watermark embedment unit;

a motion-vector creation process of, by use of said motion-searching unit, comparing a specific block included in said picture frame received from said frame extraction process with a block included in another picture frame received from said frame extraction process to create a motion vector to be output to said digital-watermark embedment unit and a picture compression unit;

a vision-sensitivity computation process of, by use of said vision-sensitivity computation unit, creating a noise-vision-sensitivity index from a variance of luminance values of said specific block included in said picture frame received from said frame extraction process and outputting said noise-vision-sensitivity index to said digital-watermark embedment unit and said picture compression unit;

a digital-watermark process of, by use of said digital-watermark embedment unit, embedding said digital watermark into said picture frame by changing luminance values of each block included in said picture frame on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation process as well as said motion vector received from said motion-vector creation process, and outputting said picture frame including said embedded digital watermark to said picture compression unit; and

a picture compression process of, by use of said picture compression unit, creating a quantization parameter on the basis of said noise-vision-sensitivity index received from said vision-sensitivity computation process, and compressing said picture frame including said embedded digital watermark on the basis of said quantization parameter as well as said motion vector received from said motion-vector creation process.

20. (original): A digital-watermark-embedding method of embedding a digital watermark into a content, said digital-watermark-embedding method comprising:

a picture input process of inputting a compressed and encoded picture as said content;

a picture-decoding process of, by use of a picture-decoding unit, carrying out a decoding operation on said compressed and encoded picture received from said picture input process as well as on an encoded motion vector and an encoded quantization parameter, which are included in said compressed and encoded picture, and outputting a motion vector and a quantization parameter, which are each obtained as a result of said decoding operation, to a digital-watermark embedment unit; and

a digital-watermark-embedding process of, by use of said digital-watermark embedment unit, embedding said digital watermark into a picture obtained as a result of said decoding operation carried out in said picture-decoding process on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding process.

21. (original): A digital-watermark-embedding method of embedding a digital watermark into a content, said digital-watermark-embedding method comprising:

a picture input process of inputting an encoded picture as said content;

a picture-decoding process of, by use of a picture-decoding unit, carrying out a decoding operation on said encoded picture received from said picture input process as well as on an encoded motion vector and an encoded quantization

parameter, which are included in said encoded picture, and outputting a motion vector and a quantization parameter, which are each obtained as a result of said decoding operation, to a digital-watermark embedment unit as well as a picture compression unit; and

a digital-watermark-embedding process of, by use of said digital-watermark embedment unit, embedding said digital watermark into a picture obtained as a result of said decoding operation carried out in said picture-decoding process on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding process; and

a frame compression process of, by use of said picture compression unit, compressing a picture including said digital-watermark embedded in said digital-watermark-embedding process on the basis of said motion vector and said quantization parameter, which are received from said picture-decoding process.